

# LETTERS TO THE EDITOR

## Technique to repair multiple muscular ventricular septal defects

To the Editor:

We read with great interest the article by Kitagawa, Durham, Mosca, and Bove<sup>1</sup> on the management of multiple ventricular septal defects (VSDs). We congratulate them on their excellent results and also on highlighting some important technical points. We would like to bring to the attention of our colleagues an additional technique, which has been used successfully in 5 patients at our center.

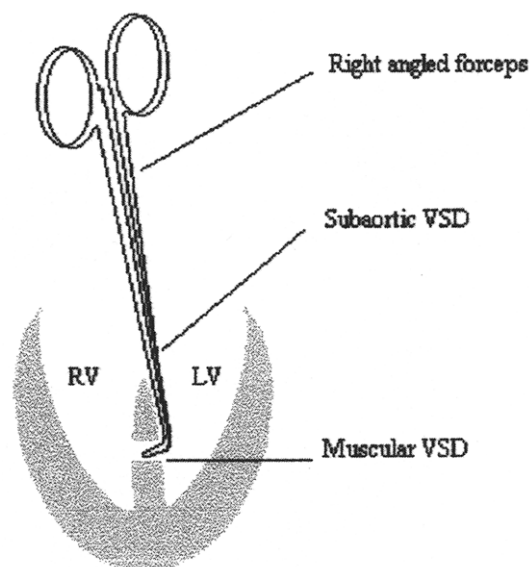
Often, multiple muscular VSDs are associated with a perimembranous VSD or have at least 1 defect that is relatively larger in dimension. We negotiate a right-angled forceps through the perimembranous VSD (via the right atrium). This permits the left ventricular side of the septum to be probed gently to locate the discrete (fewer) left-sided openings in this setting. An oversized stiff Teflon (polytetrafluoroethylene) patch mounted on a 4-0 Prolene suture (Ethicon, Inc, Somerville, NJ) is then passed into the left ventricle via the large VSD, gently negotiating the suture lengths through the muscular VSD toward the right ventricular side. The suture ends are then passed through a similar Teflon pledget on the right ventricular side of the septum. The Prolene suture is then tied firmly, thereby sandwiching the septum between the 2 stiff Teflon patches.

The rationale behind this approach has been elucidated by Kitagawa and associates in their article in support of a different technique. Five main points should be kept in mind:

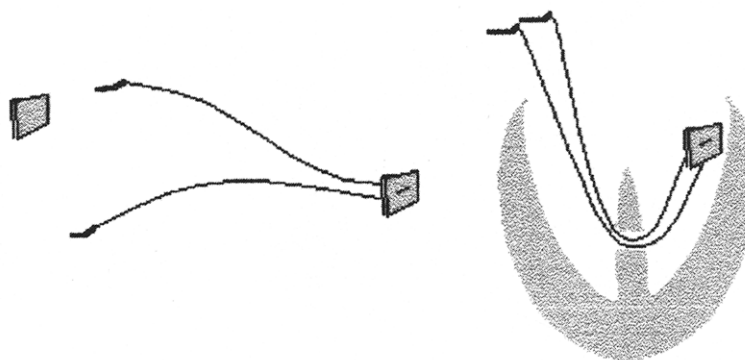
1. It is easier to locate a VSD from the left side, because the septum has fewer trabeculae on that side and there would be fewer openings of the multiple VSD on that side.
2. The pressure in the left ventricle is higher than that in the right ventricle; hence an oversized patch on the left ventricular side is pushed against the septum and becomes "leak-proof."
3. The right ventricular side has multiple trabeculae that

have to be meticulously cut to expose the muscular VSDs. In spite of that, the sutures placed on a right-sided patch often leave tracts between trabeculae that result in residual defects.

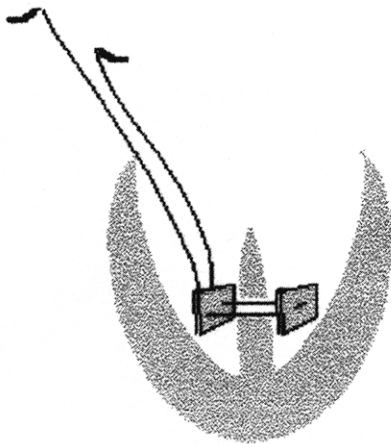
4. A left ventriculotomy should be avoided whenever possible.



**Fig 1.** Multiple muscular VSDs most often have an associated perimembranous VSD. Negotiating a right-angled forceps through the perimembranous VSD (via the right atrium) permits the left ventricular side of the septum to be probed gently to locate the discrete left-sided openings in this setting. *LV*, Left ventricle; *RV*, right ventricle.



**Fig 2.** An oversized stiff Teflon (polytetrafluoroethylene) patch is passed into the left ventricle via the large VSD, gently negotiating the suture lengths through the muscular VSD toward the right ventricular side.



**Fig 3.** The suture ends are then passed through a similar Teflon patch on the right ventricular side of the septum.



**Fig 4.** The suture length is tied firmly, thereby sandwiching the septum between the 2 stiff Teflon patches.

5. The conduction bundle does not come near the muscular VSDs.

Placing a left-sided patch without opening the left ventricle, with its attendant risks, would thus seem the best way to tackle the problem of multiple muscular VSDs. It is here that our simple method scores over other more elaborate procedures. We abandoned the authors' method of placing multiple sutures in the oversized patch, because the procedure is cumbersome and tedious, as high-lighted by Dr John Brown<sup>2</sup> in the discussion following the article. Instead, we find that passing the 2 ends of a 4-0 Prolene suture through the VSD is a neat and simple method, taking just 5 to 6 minutes to close a VSD. It can be repeated for the other VSDs without a great increase in cardiopulmonary bypass time, and we have created a maximum of 3 such sandwiches in a patient with a subsequent classic closure of the perimembranous VSD. On follow-up echocardiography, none of the patients operated on with this technique had residual shunts, which encourages us to continue using our simple technique.

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#### REFERENCES

1. Kitagawa T, Durham LA III, Mosca RS, Bove EL. Techniques and results in the management of multiple ventricular septal defects. *J Thorac Cardiovasc Surg* 1998;115:848-56.
2. Brown JW. Discussion of Kitagawa et al.<sup>1</sup>

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#### Reply to the Editor:

My colleagues and I appreciate the thoughtful comments by Kapoor and associates on our recent article concerning the techniques used for the closure of multiple muscular ventricular septal defects (VSDs). They have underscored some of the difficulties encountered in the exposure of muscular defects and describe a variation on one of the techniques that we included in our report. As these authors point out, and as emphasized in our manuscript, muscular VSDs will appear as multiple openings when viewed from the right side, but are often a single defect as seen from the left. Therefore, an oversized patch can be an effective means to close the defects when placed on the left ventricular surface. Because the pressure in the left ventricle will be higher than that in the right after repair, only a few sutures are required to anchor the patch in position. Although the authors' technique uses an outlet VSD to gain access to the left ventricular side, the basic principle described in our report is the same. Additionally, some patients will not have an additional outlet VSD of sufficient size to permit access to the left side of the septum. Kapoor and associates note that the approach described in our article may be "cumbersome," but we have not found that to be the case. As noted, the relatively few sutures required to hold the patch in place make the technique straightforward. Furthermore, in our experience only a single patch has been necessary to effectively close all the defects in the anterior and midmuscular septum, in contrast to the need for up to 3 patches in the patients described by Kapoor and his associates. Possibly, the more direct approach through the anterior muscular septum used in our patients permits more accurate placement of the patch over the center of the VSDs such that only a single patch is required.

Although the surgical management of multiple muscular VSDs remains a challenge, it is clear that secure and complete closure can be achieved in most patients using the techniques described in our report, as well as those illustrated in the letter by Kapoor and colleagues. Early repair in infancy, before secondary muscle hypertrophy makes exposure even